Cyanide

Overview

Rare but potentially rapidly lethal poisoning – coma, shock, seizures & profound lactic acidosis.

Toxic mechanism

Inhibits oxidative phosphorylation by binding to Fe^{3+} of cytochome oxidase → lactic acidosis.
Also pulmonary & coronary vasoconstriction, and in the CNS, triggers NMDA release & seizures.

Toxicokinetics

Rapidly abs, small Vd & protein bound. Probably met in liver to thiocyanate by rhodanese and elim in urine with $T_{\frac{1}{2}}$ 2-3h.

Clinical features

If exposure is to hydrogen cyanide gas (HCN) then rapid loss of consciousness.
May smell of bitter almonds (not all people can detect this)
Ingestion of cyanide salts → N&V, headache, dyspnoea, ↑BP, ↑HR, agitation, collapse, seizures.
May progression to: ↓BP, ↓HR, confusion, tetany, ↓RR, coma & death
Delayed neurotoxicity (Parkinsonism) after weeks/months may occur.

Investigations

Screening: ECG (early sinus tachy most common, later bradycardia), paracetamol, BSL
Specific bloods: EUC, ABG (AG met acidosis, ↑lac [corresponds with sev], venous PO_2 & SvO_2 approach arterial values as O_2 cannot be utilised), CN level (not avail for acute Mx)

Cyanide Level	Clinical effect
>20μmol/L (0.05mg/dL)	Symptomatic
>40μmol/L (0.1mg/dL) or lactate>10mmol/L	Potentially toxic
>100μmol/L (0.26mg/dL)	Lethal

Other: FBC

Risk assessment

Time critical response req. Immediate threat to life. If patient reaches hospital before arrest → good chance of survival with supportive care. Chronic exposure → non-specific symptoms.

Management

Resus: ABCs. **Immediate** intubation and ventilation with 100% O_2 if severe poisoning.
Supportive Care
Decontamination: Remove from source if HCN exposure. Bag clothing. Wash skin with soap & water. Charcoal may be given after intubation.
Antidotes: Needed only if significant CN ingestion likely (↓LOC, ↓BP, seizures, metabolic acidosis) then give cyanide antidote – **hydroxocobalamin**, **sodium thiosulphate**, **dicobalt EDTA**, **amyl/sodium nitrite**. (See Antidotes)

Disposition

If clinically well at 4h → d/c. Otherwise admit and if any significant exposure will be intubated so → ICU.

Notes

HCN used industrially as fumigant, also nitriles used in manufacture of plastics. Cyanide compounds, incl HCN, produced in fires. Na nitroprusside therapy can lead to CN toxicity.